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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/613,203	07/03/2003	Gurtej S. Sandhu	98-0957.01	4599

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EXAMINER

MALDONADO, JULIO J

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 08/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/613,203

Applicant(s)

SANDHU ET AL.

Examiner

Julio J. Maldonado

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13,52,53 and 59 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13,52,53 and 59 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20030703.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. The restriction as set forth in Office Action mailed on 07/03/2003 is withdrawn in view of applicants' cancellation of claims 14-51 and 54-58.
2. Claims 1-13, 52, 53 and 59 are pending in the application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, 4, 8, 10 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Horiike et al. (U.S. 5,290,609).

Horiike et al. (Fig.4) teach a substrate assembly comprising a capacitor electrode (15); a plurality of tantalum oxide (Ta_2O_5) layers (16) over and contacting said capacitor electrode (15) and each other; and a second electrode (18) disposed over and contacting an uppermost Ta_2O_5 layer of said plurality of layers (16) (column 7, lines 18 – 41).

5. Claims 1, 2, 4, 8, 10 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishioka et al. (U.S. 5,489,548).

Nishioka et al. (Figs.1-14) teach a capacitor structure comprising a capacitor electrode (42); a high-K dielectric layer (42) over and contacting said capacitor electrode (42); and a second electrode (46) disposed over and contacting said high-K dielectric layer (42) (column 5, line 31 – column 9, line 55). Furthermore, Nishioka et al. teach wherein said high-K dielectric layer is selected from the group including, among other high-K dielectric materials, Ta₂O₅ and yttrium oxide, and wherein said high-K dielectric layer (42) can comprise combination of said materials and layers of said materials (column 9, lines 24 – 35). Therefore, Nishioka et al. is open to a dielectric layer (42) comprising a plurality of Ta₂O₅ layers.

6. Claims 1-4 and 8-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Summerfelt et al. (U.S. 6,362,068 B1).

In reference to claims 1-4, 8-11 and 13, Summerfelt et al. (Fig.5) teach a substrate assembly comprising a capacitor electrode (30); a plurality of high-K dielectric layers (32, 34, 36) over and contacting said capacitor electrode (30), wherein a common metal is present in said layers of said plurality; and an upper capacitor electrode (46) over and contacting an uppermost surface of an uppermost layer (36) of said plurality of dielectric layers (32, 34, 36) (column 3, line 17 – column 5, line 63).

Furthermore, Summerfelt et al. teach wherein a first layer (32) of said plurality of dielectric layers (32, 34, 36) is used as a barrier to prevent leakage, wherein at least two of said plurality of dielectric layers (32, 34, 36) has different thicknesses, and wherein said first layer (32) of said plurality of dielectric layers (32, 34, 36) is a first oxide layer

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and said second layer of said plurality of dielectric layers is a second oxide layer different from said first oxide layer (column 3, lines 17 – 30).

In reference to claim 12, Summerfelt et al. teach wherein said first dielectric layer and second dielectric layer are made from different oxide layer, and wherein said first and second dielectric layer have different thicknesses. Therefore, Summerfelt inherently teach wherein said first dielectric contains a first amount of oxygen; and wherein said second dielectric contains a second amount of oxygen different from said first amount.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 5-7, 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horiike et al. ('609).

Horiike et al. (Fig.4) teach a substrate assembly comprising a capacitor electrode (15); a plurality of tantalum oxide (Ta_2O_5) layers (16) over and contacting said capacitor electrode (15) and each other; and a second electrode (18) disposed over and contacting an uppermost Ta_2O_5 layer of said plurality of layers (16) (column 7, lines 18 – 41).

Horiike et al. also teach wherein each of said Ta_2O_5 layers of said plurality of layers has a thickness of 40 Angstroms (column 7, lines 35 – 36). Horiike et al. fail to

teach wherein said plurality of dielectric layers defines a thickness of at most 200 Angstroms, wherein a first layer of said plurality has a thickness of at least 10 Angstroms. However, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. MPEP 2144.05. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the thicknesses disclosed in Horiike et al. to arrive at the claimed invention.

Still, Horiike et al. fail to teach wherein said plurality of said dielectric layers has a total thickness of 50-70 angstroms, and wherein said plurality defines an individual thickness of about 20 Angstroms. Notwithstanding, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

9. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imai et al. (U.S. 5,440,157) in view of Horiike et al. (U.S. 5,290,609).

Imai et al. (Fig.3D) teach a capacitor structure including a top electrode (111); a Ta₂O₅ layer under said top electrode (111); a silicon nitride layer (109) under said Ta₂O₅ layer; and a bottom silicon electrode (108) under said silicon nitride layer (109) (column 7, line 36 – column 8, line 27).

Furthermore, Imai et al. teach as part of the conventional art that said top electrode could be a platinum electrode (column 4, lines 65 – 66). Although not taught as a preferred embodiment, Imai et al. teaches this embodiment nonetheless, and disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. In re Susi, 169 USPQ 423 (CCPA 1971). "A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use." In re Gurley, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). Even a teaching away from a claimed invention does not render the invention patentable. See Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998), where the court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact

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that it is disclosed." To further clarify, a prior art opinion that a claimed invention is not preferred for a particular limited purpose, does not preclude utility of the invention for that or another purpose, or even preferability of the invention for another purpose.

Imai et al. fail to teach that said Ta₂O₅ layer comprises a top Ta₂O₅ layer under said top electrode; and a bottom Ta₂O₅ electrode under said top Ta₂O₅ and contacting said top Ta₂O₅ layer. However, Horiike et al. teach a capacitor structure including a top electrode (18); a Ta₂O₅ layer (16) under said top electrode (18); and a bottom electrode (15) under said Ta₂O₅ layer (16), wherein said Ta₂O₅ layer (16) comprises a plurality of Ta₂O₅ layers stacked one on top of the other for the purpose of providing better thickness control (column 3, lines 28 – 32 and column 7, lines 18 – 63).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Imai et al. and Horiike et al. to enable the layer the Ta₂O₅ layer of Imai et al. to comprise the multiple arrangement of Ta₂O₅ layer according to the teachings of Horiike et al., for the further advantage of thickness control (column 3, lines 28 – 32).

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Julio J. Maldonado whose telephone number is (571) 272-1864. The examiner can normally be reached on Monday through Friday.

11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax number for this group is 703-872-9306 for before final submissions, 703-872-9306 for after final


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submissions and the customer service number for group 2800 is (703) 306-3329.

Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.

Julio J. Maldonado
Patent Examiner
Art Unit 2823

Julio J. Maldonado
August 17, 2004



George Fourson
Primary Examiner